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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,809	09/17/2003	Masanobu Nishitani	116927	4046
25944	7590	06/01/2007	EXAMINER	
OLIFF & BERRIDGE, PLC			SAINT CYR, LEONARD	
P.O. BOX 19928			ART UNIT	PAPER NUMBER
ALEXANDRIA, VA 22320			2626	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/663,809	<b>Applicant(s)</b> NISHITANI ET AL.	
	<b>Examiner</b> Leonard Saint-Cyr	<b>Art Unit</b> 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 101*

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 1 - 9 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1 - 9 define non-statutory processes because they merely manipulate an abstract idea (Mathematical algorithm) without a claimed limitation to a practical application. The disclosed invention has a practical application in the technological arts (e.g. speech recognition); however, the claimed process, a series of steps to be performed on a computer, simply manipulates an abstract idea without a claimed limitation to the practical application and does not have any post or pre computer process activity.

A review of application 10,663,809 shows the disclosed invention thereof to be a method for creating an HMM. This is a practical application within the technological arts. However, it does not disclose specific hardware, specific software, or a combination thereof for performing the claimed functions.

In the instant application the disclosure is directed to any and every structure for carrying out the claimed functions, and not solely to specific structure.

Claims 1-9 reviewed in light of the specification, simply recite a mathematical algorithm for creating an HMM for speech recognition.

As can be seen by claims 1 - 9, these claims recite a mathematical algorithm by setting forth the step of "setting plural types of the Gaussian distribution numbers from a predetermined value to a maximum distribution number for each of the plurality of states constituting the HMM; and computing a description length for each of the plurality of states having the plural types of Gaussian distribution numbers using a Minimum Description Length criterion." These steps are mathematical in nature.

The above review of the claims shows that the subject matter claimed in addition to the mathematical algorithm is not sufficient on its own to render the claims as a whole statutory.

It is readily apparent that when claims 1 - 9 are each taken as a whole, the claims are directed to the preemption of a mathematical algorithm, and thus are non-statutory.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1- 9 are rejected under 35 U.S.C. 102(a) as being anticipated by Shinoda et al., (HMM Size Reduction using MDL Criterion, Japan, March 2002).

As per claim 1, Shinoda et al., teach an acoustic model creating method of creating an HMM (Hidden Markov Model) by optimizing, for each state, Gaussian

Art Unit: 2626

distribution numbers of the respective states constituting the HMM and retraining the optimized HMM using training speech data, the method comprising:

setting plural types of the Gaussian distribution numbers from a predetermined value to a maximum distribution number for each of the plurality of states constituting the HMM ("model having a large number of distributions trained with sufficient training data"; page 1; introduction, lines 19 – 23);

computing a description length for each of the plurality of states having the plural types of Gaussian distribution numbers using a Minimum Description Length criterion ("Minimum Description Length criterion minimum is selected for each state"; page 1; introduction, lines 23, and 24);

selecting a state having the Gaussian distribution number whose description length is minimum, for every state (page 4, line 4); and

constructing the HMM in accordance with the state having the Gaussian distribution number whose description length is minimum, selected for every state ("re-estimate all HMM parameters"), and retraining the constructed HMM using the training speech data ("re-training HMM"; page 4, lines 5 – 7; page 5, lines 8 – 10).

As per claim 2, Shinoda et al., further disclose that for the Minimum Description Length criterion, a description length  $l_i(x_N)$  using a model  $i$  when a model set  $\{1, \dots, i, \dots, I\}$  and data  $x_N = \{x_1, \dots, x_N\}$  ( $N$  being a data length) are given is expressed as the following general equation,

$$l_i(x_N) = -\log P^{(i)}(x_N) + \frac{1}{2} \log N + \log I.$$

$\theta(i)$ : parameter of model  $i$ .

$\theta(i)$ =maximum likelihood estimate of  $\theta_{1,i}, \theta_{\beta,i}$

$\beta(i)$ : dimension (degree of freedom) of model  $i$

and in the general equation that computes the description length, the model set  $\{1, \dots, i, \dots, l\}$  is considered as a set of states in which plural types of the Gaussian distribution numbers from a predetermined value to the maximum distribution number are set for a predetermined state in a predetermined HMM, where, when the number of types of the Gaussian distribution numbers is  $l$  ( $l$  is an integer satisfying  $l \geq 2$ ), then  $1, \dots, i, \dots, l$  are symbols that specify the respective distribution number types from a first type to an  $l$ -th type, and the general equation is used as an equation for computing the description length of the state having an  $i$ -th type of distribution number out of  $1, \dots, i, \dots, l$  (page 2, section 3 – page 3, line 11).

As per claims 3, and 4, Shinoda et al., further disclose that the second term on the right side of the equation being multiplied by a weighting coefficient  $\alpha$ , and the third term on the right side being omitted ("the second term is multiplied by penalty coefficient  $\alpha$ "; page 3, lines 10, and 11).

As per claim 5, Shinoda et al., further disclose that  $x_N$  being a set of the respective training speech data obtained by matching in time series ( $x_1, \dots, x_N$ ) a plurality of the training speech data with the respective states of the HMMs for every state, using the HMMs in which the respective states have any one of the Gaussian

distribution numbers from the predetermined value to the maximum distribution number ("large number of distributions"; page 2, section 3, lines 1, and 2; page 1, lines 19 - 23).

As per claim 6, Shinoda et al., further disclose that the Gaussian distribution numbers being the maximum distribution number ("large number of distributions"; page 1, lines 19 – 23).

As per claim 7, Shinoda et al., further disclose that the HMMs being syllable HMMs ("phonological"; page 7, lines 3 – 7).

As per claim 8, Shinoda et al., further disclose that the syllable HMMs having the same consonant out of the states constituting the syllable HMMs tie an initial state or at least two states including an initial state in the syllable HMMs, and the syllable HMMs having the same vowel tie a final state of the states having self loops or at least two states including the final state in the syllable HMMs ("initial model"; page 4, section 4, line 5 – page 6, line 7)

As per claim 9, Shinoda et al., further disclose that a speech recognition device recognizes input speech using HMMs (Hidden Markov Models) as acoustic models for feature data obtained by feature analysis of the input speech, the HMMs created by the acoustic model creating method according to claim 1 being used as the HMMs which are the acoustic models ("used acoustic feature"; page 4, section 5, lines 5, and 6).

***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Shinoda (US PAP 2002/0184020) teach a speech recognition apparatus that adjusts the number of elements distributions of the mixed distributions.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard Saint-Cyr whose telephone number is (571) 272-4247. The examiner can normally be reached on Mon- Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.



Art Unit: 2626

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LS  
05/23/07

  
RICHEMOND DORVIL  
SUPERVISORY PATENT EXAMINER